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appeared in 1907, and the third was ready in 1914, but its publication was prevented by the war and the unfavorable conditions of printing. The author has included the more important recent results of investigation, presented in his very attractive style, and with abundant illustrations.

The organization of the subject is peculiar to CHODAT, and therefore the volume has a flavor of its own. The four general divisions of the subject are as follows: "Physiologie générale," "La cellule, les tissus," "Physiologie spéciale," and "Génétique." The chapter topics under this general organization are often unusual. For example, practically everything usually treated under morphology, with the exception of anatomy, is presented under "special physiology," the evident suggestion being that structures are only significant in connection with their functions.

It is unusual for a book of nearly 900 pages to contain only ten chapters, and the subjects are suggestive of the organization. They are as follows: under general physiology, "Constitution de la matière vivante" and "Capta-tion et transformation de l'énergie"; under the cell and tissues, "La cellule," "Organogénie," and "Anatomie"; under special physiology, "Fonctions de circulation et d'élaboration," "Fonctions de relation," and "Reproduction"; under genetics, "Variations, hérédité," and "Conclusion" (theories of the origin of species). The volume closes with a brief classification of plants.—J. M. C.

MINOR NOTICES

Dictionary of botanical equivalents.—ARTSCHWAGER and SMILEY³ have prepared a very convenient dictionary which gives accurate translations of technical terms which are not usually found in ordinary dictionaries. All technical terms have been omitted when the English equivalent would be practically a repetition of French and German terms of Latin or Greek origin. As the compilers state, it is "a practical hand-book, accurate within the limits set for it." The publishers have also provided interleaved blank pages, so that users of the volume may amplify the list. It will certainly prove a very convenient volume for the reader of French and German botanical literature, both in saving time and in insuring accuracy.—J. M. C.

NOTES FOR STUDENTS

Chlorophyll inheritance.—Considerable interest has always been focussed upon reported cases of non-Mendelian inheritance. For the most part these have later been explained satisfactorily on a Mendelian basis, so that at the present time the only clearly recognized cases of non-Mendelian inheritance

³ ARTSCHWAGER, ERNST, and SMILEY, EDWINA W., Dictionary of botanical equivalents (French-English, German-English). 16mo. pp. ii+137. Baltimore: Williams & Wilkins Co. 1920.

are certain types of chlorophyll inheritance. WINGE⁴ makes a hopeful attempt to classify all known cases of chlorophyll inheritance according to the following scheme:

I. The characters are situated in the nucleus and show Mendelian segregation, self-colored green usually being dominant. To this class belong the well known *alniba*, *citrina*, *chlorina*, *variegata*, and *albomarginata* forms of *Melandrium*, *Antirrhinum*, *Pelargonium*, *Mirabilis*, *Urtica*, *Aquilegia*, *Lunaria* (CORRENS, BAUR, and others). The most complex case on record is one recently solved by LINDSTROM⁵ in which the F₂ of a trihybrid gives the remarkable ratio of 36 green:9 virescent-white:7 yellow:12 white.

II. The characters are situated elsewhere than in the nucleus and do not show Mendelian inheritance. This class is further split up in the following interesting way: (a) The characters are transmitted by the plastids themselves. In this case plants which are endowed with both green and colorless plastids may, through the uneven distribution of plastids of the two types at cell division, give rise to pure green and pure white areas, really a "somatic segregation." Such areas, through seed, will breed true to their local character. There is one known case, the "mosaic" *Pelargonium zonale* of BAUR, in which plastids evidently accompany the male nucleus at fertilization, for here inheritance is bi-parental. In all other known cases no plastids accompany the male nucleus, and inheritance is strictly maternal. In this last group we find the *albomaculata* forms of *Mirabilis* (CORRENS), *Antirrhinum* (BAUR), and *Primula* (GREGORY).

(b) The characters are situated in the cytoplasm. In this case no thoroughgoing "somatic segregation" is possible. A "hybrid" plant, combining the character for normal chlorophyll development with the alternative character for chlorophyll deficiency, will have these characters well diffused and intermingled through the cytoplasm. At cell division there may result a somewhat uneven distribution of these effective elements in the cytoplasm, resulting in relatively "lighter" and "darker" areas on the plant. This process of "dilution," however, has never been known completely to "purify out" either of the elements. Pure albinos or pure green individuals are never produced by these "hybrids." Here too we find in one case, the *albomaculata* form of *Capsella* (IKENO), the male nucleus seems to be accompanied by some cytoplasm, since the chlorophyll inheritance is bi-parental. In the only other case on record, the *albomaculata* of *Humulus* (WINGE), the male evidently contributes no cytoplasm, for inheritance is strictly maternal.

This classification seems fairly satisfactory, but it involves some fundamentally different conceptions from those of CORRENS and BAUR. Probably

⁴ WINGE, O., On the non-Mendelian inheritance in variegated plants. *Compt. Rend. Lab. Carlsberg* 34:1-20. *figs. 4.* 1919.

⁵ LINDSTROM, E. W., Concerning the inheritance of green and yellow pigments in maize seedlings. *Genetics* 6:91-110. 1921.

the most significant fact, and one about which there can no longer be any doubt, is that chlorophyll inheritance is sometimes Mendelian and sometimes non-Mendelian. Naturally this suggests that other types of characters also may be, at least in some cases, non-Mendelian in inheritance.—M. C. COULTER.

Plagiotropic shore plants.—From the results of experiments carried on largely with *Atriplex prostratum*, TURESSON⁶ reached the conclusion that the external factor causing prostrate growth is intense illumination, but that the growth movements are really geotropic in their nature. Emphasis is placed upon the fact that there are apparently two distinct sorts of plagiotropy, the one resulting from congenital habits of growth, and the other from response to environmental conditions. At times a single species, such as the one under experiment, will prove to consist of two such forms.—GEO. D. FULLER.

Haustoria of *Meliola*.—Miss DOIDGE,⁷ in continuation of her studies of South African Perisporiaceae, has examined the haustoria of *Meliola*, whose species occur chiefly on leaves and shoots of forest trees and shrubs. She determined that the species are true parasites, sending haustoria into the cells of the host, penetrating the cuticle and in some cases sclerenchyma cells. The species differ in the length and character of the penetrating filament.—J. M. C.

North American flora.—Part 2 of volume 32 includes a continuation of Rubiaceae by STANDLEY. The preceding part included 20 genera, to which the present part adds 41 more. Much the largest genera are *Bouvardia* with 30 species (12 new) and *Exostema* with 26 species (5 new). The remaining 5 new species are distributed among the smaller genera.—J. M. C.

Vegetation of Paraguay.—Continuing his report on the scientific results of a botanical expedition to Paraguay, CHODAT⁸ discusses the Apocynaceae, Urticales, and Araceae observed and collected. A number of new species are described, and rather extensive notes are made on distribution and ecology.—GEO. D. FULLER.

⁶ TURESSON, GÖTE., The cause of plagiotropy in maritime shore plants. Lunds Univ. Arsskrift, N.F. Avd. 2. 16: no. 2. pp. 32. pls. 2. 1919.

⁷ DOIDGE, ETHEL M., South African Perisporiaceae. VI. The haustoria of the genera *Meliola* and *Irene*. Trans. Roy. Soc. S. Africa 9: 117-127. figs. 7. 1921.

⁸ CHODAT, R., La végétation du Paraguay. Fasc. 3. Geneva. pp. 291-379. figs. 53. 1920.